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International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 17/30 — A1

(11) International Publication Number: WO 97/46955

(43) International Publication Date: 11 December 1997 (11.12.97)

(21) International Application Number: PCT/US97/09062

(22) International Filing Date: 28 May 1997 (28.05.97)

(30) Priority Data:

60/018,964	7 June 1996 (07.06.96)	US
08/839,310	18 April 1997 (18.04.97)	US

(81) Designated States: CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

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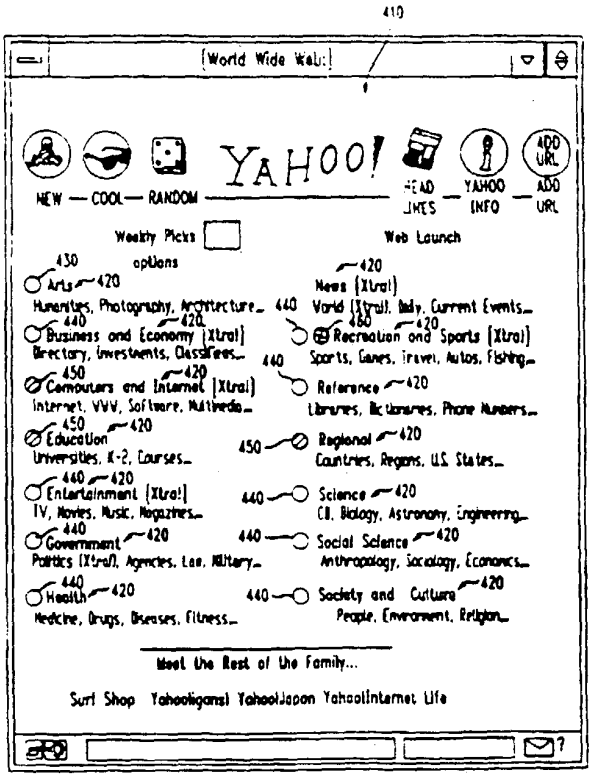
(54) Title: INTERNET ACCESS SYSTEM AND METHOD WITH ACTIVE LINK STATUS INDICATORS

(57) Abstract

An Internet access system and method includes active link status indicators that give a user control over when a document is loaded into a cache. The system and method notifies a user of the presence or absence of a document in the cache by changing the visual characteristics of an associated link status indicator. If a user selects a link status indicator with a mouse or other input device, the system and method will fetch the document corresponding to the associated Internet link and place the document in the cache without displaying the document to the user. The system and method of this invention allow a user to fetch a document and store it in the cache while the user is viewing another document. The link status indicators include icons that are displayed adjacent to the associated Internet link.



INTERNET ACCESS SYSTEM AND METHOD WITH ACTIVE LINK STATUS INDICATORS

CROSS REFERENCE TO RELATED APPLICATION

This application is related to prior provisional application Serial No. 60/018964, filed on June 7, 1996.

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates to systems for accessing the Internet. More specifically, this invention is directed to an Internet access system and method with active link status indicators.

2. Description of Related Art

Most distributive information networks, such as the Internet, utilize local caches to reduce the system response time. An Internet access system, such as a World Wide Web browser, generally has access to a local cache. When a user selects a Web link to request a document, the Web browser first determines if the requested document is present in the local cache. If the requested document is present in the local cache, the Web browser simply displays the copy of the document in the cache. If the requested document is not present in the local cache, the Web browser fetches the document from the Web, places the document in the local cache and displays the document to the user.

A cache may be shared by many users of the Web, or it may only be accessible to a single user. When the cache is shared by many users, a document that has been fetched by one user may be fetched from the cache in response to subsequent requests by other users. Therefore, when the cache is shared by a large number of users, most popular Web documents will already be cached when any given user requests the document. This reduces the amount of network traffic and also reduces the length of time that a user must wait for the document.

a user selects the name of a link, the link name changes color to indicate that it has been selected.

Another reason that the Goldberg system is not appropriate for Web browsers is that Internet links are being increasingly represented by graphical elements, i.e., pictures. Because of the variability of graphical elements, it is difficult to provide a standardized method of modifying their display characteristics.

In addition, the Goldberg system immediately displays the document that is loaded into the cache. Thus, the Goldberg system does not allow a user to view one document while another document is loaded into the cache.

SUMMARY OF THE INVENTION

This invention provides a system and method for accessing data from a distributive information network, such as the Internet. The system and method of this invention provide active link status indicators with visual characteristics that convey information about associated documents that are available for retrieval from the information network. In addition, the active link status indicators give a user control over when a document is fetched from the information network and stored in the cache. The system and method of this invention is particularly applicable to World Wide Web browsers.

The system and method of this invention display link status indicators that are associated with corresponding Internet links. The visual characteristics of the displayed link status indicator indicates whether or not the document represented by the Internet link is stored in the cache. If a user selects a link status indicator (e.g., by "clicking" on the indicator with a mouse), the system and method will fetch the document associated with the corresponding Internet link and store it in the cache without displaying the document to the user. Therefore, the system and method of this invention

The processor 200 sends data to and receives data from remote Internet servers 500 over a communication link 210. The processor 200 sends the data to the cache 300 over a signal line 220, and to the display 400 over a signal line 230.

The processor 200 is programmed with Internet access software, preferably World Wide Web browsing software, that has been modified by means of Computer Graphics Interface scripts to embody the invention. In operation, the processor 200 displays the data (e.g., documents) retrieved from the Internet servers 500 on the display 400.

Fig. 1 shows a representative document 410 from a World Wide Web site displayed by the processor 200 on the display 400. The displayed document 410 includes a list of Internet links 420 that are associated with other documents that are accessible from the Internet servers 500, such as from the World Wide Web. The Internet links 420 are shown as text, but they may also be graphical elements.

When a user of the system 100 selects a particular Internet link 420 with a mouse or other input device (not shown), the processor 200 retrieves or fetches the document associated with that Internet link 420. If the user selects a document that is already stored in the cache 300, the processor 200 retrieves the document from the cache 300 and displays it on the display 400. If the selected document is not already stored in the cache 300, the processor 200 fetches the document from the Internet server 500 on which the document is located and displays the document on the display 400.

Each of the Internet links 420 has a link status indicator 430 associated with, but displayed distinctly from, the Internet link 420. The visual characteristics (i.e., the display state) of each link status indicator 430 indicates whether a copy of the document associated with the

In a second embodiment, the link status indicator 430 is set to a third display state, preferably a yellow button, when the version of the corresponding document stored in the cache 300 is not the latest version.

In addition, additional link status indicators can be used to convey other information relevant to the user in deciding whether or not to pre-fetch a document. For example, an additional link status indicator 460 can be used to warn the user that fetching the associated document will exceed a predetermined cost budget.

Fig. 3 shows a preferred control routine for the Internet access system 100 of this invention. The control routine is iterative, and is performed for every Internet link 420 displayed by the processor 200 on display 400.

The routine starts at step S200 and proceeds to step S210, where the control system sets the flag F to zero. Control then continues to step S220, where the control system determines if the document represented by the Internet link 420 is stored in the cache 300. If the document is not stored in the cache 300, control continues to step S230. Otherwise, control jumps to step S240. In step S230, the control system sets the link status indicator 430 associated with the document to the third display state. Control then jumps to step S280.

In step S240, the control system determines if the document stored in the cache 300 is the latest version, i.e., whether a newer version is available for fetching from the remote server 500. If the version of the document in the cache 300 is not the latest version, control continues to step S250. Otherwise, control jumps to step S260. In step S250, the control system sets the link status indicator 430 associated with the document to the second display state. Control then jumps to step S280.

optical disk and disk drive, a hard drive, flash memory or the like.

While this invention has been described in conjunction with the specific embodiments outlined above, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. As discussed above, the indicator 430 is not limited to the shape and color shown in the preferred embodiment of Fig. 2. Accordingly, the preferred embodiments of the invention as set forth above are intended to be illustrative not limiting. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

6. The system of claim 1, wherein, for each at least one link, when the corresponding other data is stored in the memory, the visual characteristics of one associated link status indicator indicates whether an updated version of the corresponding other data is available for retrieval from the distributive information network.

7. The system of claim 1, wherein, for each at least one link, the visual characteristics of one associated link status indicator indicates whether fetching the corresponding other data from the distributive information network will exceed a predetermined budget threshold.

8. A method of accessing and displaying data from a distributive information network, comprising:

receiving data from the distributive information network;

displaying the retrieved data;

displaying at least one link corresponding to other data accessible from the distributive information network;

displaying, for each link, at least one link status indicator associated with but distinct from that link; and

conveying, for each link, information about the corresponding other data through visual characteristics of the at least one associated link status indicator;

wherein, when one of the at least one link status indicators associated with one of the at least one links is selected, the method further comprising:

retrieving the other data corresponding to the selected link status indicator; and

storing the retrieved other data in a memory without displaying the retrieved other data.

FIG. 1

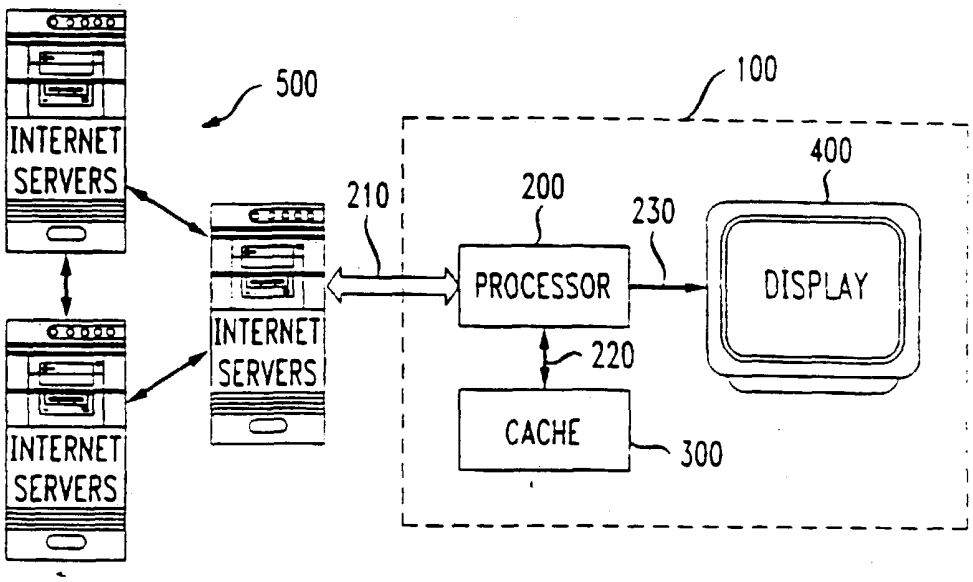
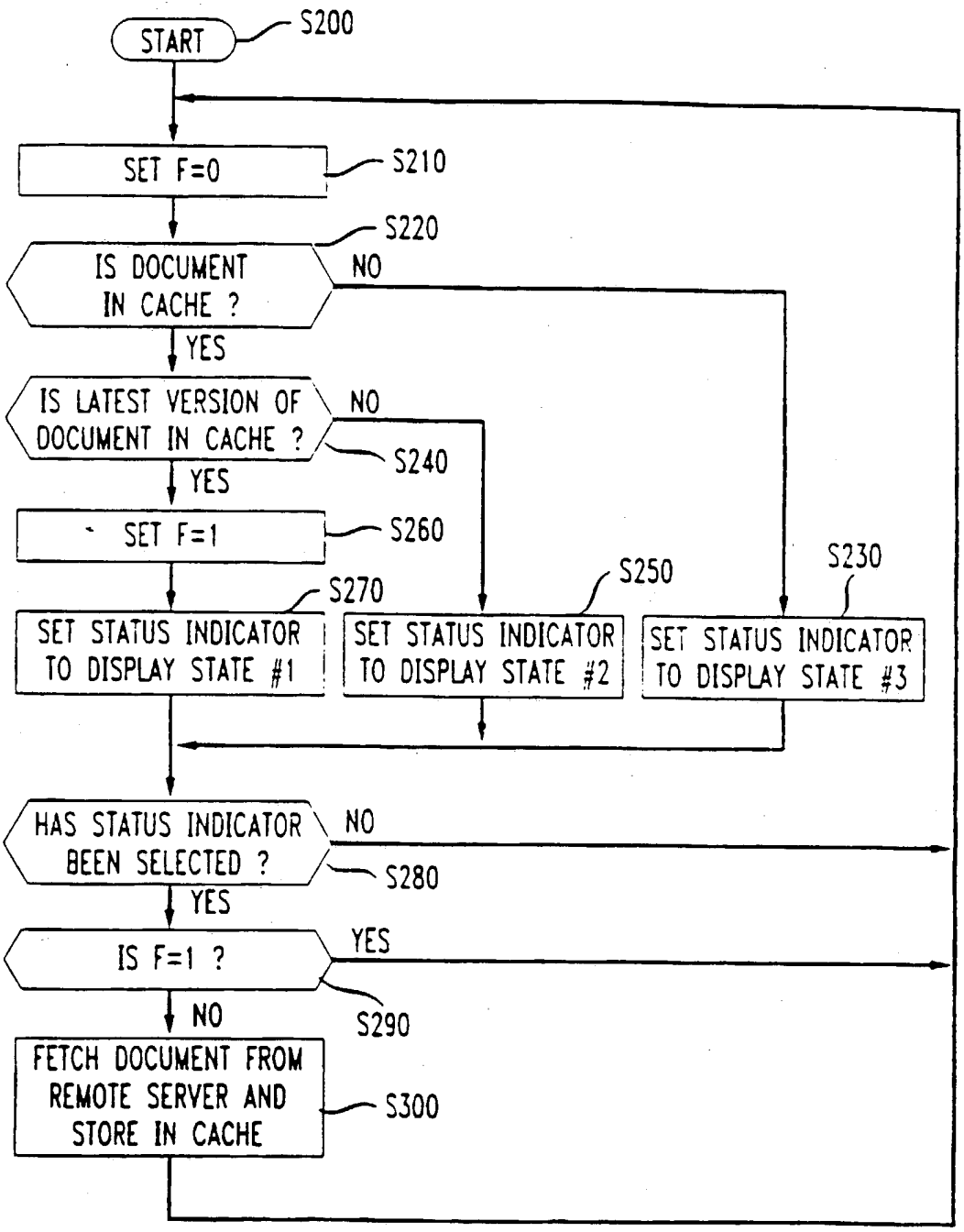

INTERNET SERVERS
INTERNET SERVERS
INTERNET SERVERS
500
100
210
200
230
400
PROCESSOR
DISPLAY
220
CACHE
300

FIG. 3


START
S200
SET F=0
S210
IS DOCUMENT IN CACHE ?
S220
NO
YES
IS LATEST VERSION OF DOCUMENT IN CACHE ?
NO
S240
YES
SET F=1
S260
SET STATUS INDICATOR TO DISPLAY STATE #1
S270
SET STATUS INDICATOR TO DISPLAY STATE #2
S250
SET STATUS INDICATOR TO DISPLAY STATE #3
S230
HAS STATUS INDICATOR BEEN SELECTED ?
NO
S280
YES
IS F=1 ?
YES
S290
NO
FETCH DOCUMENT FROM REMOTE SERVER AND STORE IN CACHE
S300

INTERNATIONAL SEARCH REPORT

Interna ii Application No
PCT/US 97/09062

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	GOLDBERG D ET AL: "How to program networked portable computers" PROCEEDINGS. FOURTH WORKSHOP ON WORKSTATION OPERATING SYSTEMS (CAT. NO.93TH0553-8), PROCEEDINGS OF IEEE 4TH WORKSHOP ON WORKSTATION OPERATING SYSTEMS. WWOS-III, NAPA, CA, USA, 14-15 OCT. 1993, ISBN 0-8186-4000-6, 1993, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC. PRESS, USA, pages 30-33, XP002042674 cited in the application see page 32, left-hand column, paragraph 5.0 ---	1,3-5,8, 10-12
A	DOUGLIS F ET AL: "WebGUIDE: Querying and navigating changes in Web repositories" COMPUTER NETWORKS AND ISDN SYSTEMS, vol. 28, no. 11, May 1996, page 1335-1344 XP004018231 see page 1340, left-hand column, paragraph 3.3 - right-hand column, paragraph 3.4 -----	1,2,6,8, 9,13

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